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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/461,643	12/14/1999	KEITH DOW	10559/108001	4089

20955 7590 04/11/2003

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EXAMINER

LEE, CHRISTOPHER E

ART UNIT	PAPER NUMBER
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2189

DATE MAILED: 04/11/2003

15

Please find below and/or attached an Office communication concerning this application or proceeding.

Interview Summary	Application No.		Applicant(s)	
	09/461,643		DOW, KEITH	
	Examiner		Art Unit	
	Christopher E. Lee		2189	

All participants (applicant, applicant's representative, PTO personnel):

(1) Christopher E. Lee / USPTO.

(3) Jerry Lentz (Reg. No. 33,945).

(2) Mark H. Reinhart / USPTO.

(4) _____.

Date of Interview: 07 April 2003.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☒ Yes e) ☐ No.

If Yes, brief description: Request for a telephone interview via FAX on 25th of March, 2003 (See Attachment).

Claim(s) discussed: Exemplary claim 1.


Identification of prior art discussed: Applicant Admitted Prior Art and Boaz et al. of record :

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.


MARK H. REINHART
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

Summary of Record of Interview Requirement

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case unless both applicant and examiner agree that the examiner will record same. Where the examiner agrees to record the substance of the interview, or when it is adequately recorded on the Form or in an attachment to the Form, the examiner should check the appropriate box at the bottom of the Form which informs the applicant that the submission of a separate record of the substance of the interview as a supplement to the Form is not required.

It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Discussed operation of invention using geometry which allows elimination of ground trace (165) on 2nd layer of prior art shown in Fig. 2. Advantage is gained to improve isolation between main traces. Discussed geometry of signal lines per Fig. 3 to connect at pin (155) with traces (205, 215) at right angle from 18mil traces (200,210) and acute angle to pin. Applicant will amend claim to more clearly state trace geometry around gap (220) on a single layer. Applicant will amend Fig. 3 drawing to include dimensions dropped from original informal drawing. The Examiner will consider amendment in view of prior art when the amendment is submitted.

Attorney's Docket No.: 10559-108001 / P7643

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Keith Dow
Serial No : 09/461,643
Filed : December 14, 1999
Title : IMPROVED SIGNAL ROUTING BETWEEN A MEMORY CONTROL
UNIT AND A MEMORY DEVICE

Art Unit : 2181
Examiner : Christopher E. Lee

TO: EXAMINER LEE

FAX: 703 746-9248

FROM: JERRY LENTZ, REG. NO.: 33,945

E-MAIL: LENTZ@FR.COM

PHONE: 858 678-4356

REQUEST FOR A TELEPHONIC INTERVIEW

Dear Examiner Lee,

I would like to schedule a telephonic interview to discuss a proposed response to an Office Action mailed January 28, 2003.

Proposed Agenda Items:

- 1) Proposed amendments to the claims to more distinctly claim the invention and obviate the rejections under 35 USC 103.
- 2) An explanation of the differences between the proposed amended claims and the prior art cited.
- 3) An explanation of the differences between the claimed invention and the alleged AAPA cited in the Office Action.

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

Date of Transmission November 26, 2002

Signature

Typed or Printed Name of Person Signing Certificate Deborah K. Sim

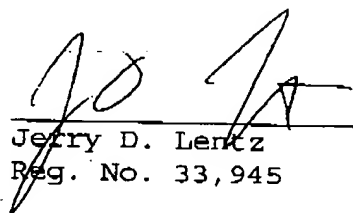
Attorney's Docket No.: 10559-108001 / P7643

My office is in California, however, I'm an early riser and could speak with you as early as 9:00 a.m. EST.

Please schedule this interview as soon as possible. We would like to file a response by this Friday, March 28, to meet the 2-month filing deadline.

Sincerely,

Date: 3/25/03



Jerry D. Lentz
Reg. No. 33,945

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TO: EXAMINER CHRISTOPHER LEE

FILE: 09/461,643

FROM: JERRY LENTZ

PH: 858 678-4336

ATTACHED - DRAFT RESPONSE FOR DISCUSSION

Attorney's Docket No.:10559-108001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Keith Dow Art Unit: 2181
Serial No.: 09/461,643 Examiner: Christopher E. Lee
Filed : December 14, 1999
Title : IMPROVED SIGNAL ROUTING BETWEEN A MEMORY CONTROL
UNIT AND A MEMORY DEVICE

Commissioner for Patents
Washington, D.C. 20231

DRAFT COPY OF PROPOSED RESPONSE

In response to the action mailed January 28, 2003, please amend the application as follows:

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In the claims:

1. (Currently amended) A computer system comprising:
a processor;
a memory unit configured to store data used by the processor;
a memory control unit configured to manage data flowing into and out of the memory unit;
a circuit board comprising:
at least two layers formed in parallel to a surface of said circuit board,
a first signal line, formed on a first layer of the circuit board and connected between a first pin [connection] on the memory unit and a first pin on the memory control unit; and
a second signal line also formed on the first layer of the circuit board and connected to the first pin [connection] on the memory unit, a first portion of the second signal line substantially parallel to a first portion of the first signal line, a second portion of the second signal line at an acute angle relative to a second portion of the first signal line,
[wherein the widths of the lines and the distance separating the lines are each substantially equal,] and
wherein said first layer defines a non-grounded gap between said first and second lines
3. (Original) The system of claim 1, further comprising third and fourth signal lines, on a second layer of the circuit board, different than the first layer.
4. (Previously amended) The system of claim 1, wherein the first signal line and the portion of the second signal line that

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is routed substantially parallel to the first signal line have substantially equal widths.

5. (Previously amended) The system of claim 4, wherein the first signal line and the portion of the second signal line that is routed substantially parallel to the first signal line are separated by a distance substantially equal to said widths.

6. (Previously amended) The system of claim 5, wherein the widths of the lines and the distance separating the lines are each substantially equal to 5 mils.

7. (Previously amended) The system of claim 1, wherein the memory unit comprises a RAMBUS™ device.

8. (Currently amended) A method for use in routing signals between a memory unit and a memory control unit, the method comprising:

delivering a first signal over a first signal line on a first layer formed in parallel to a second layer on a surface of a multi-layer circuit board and connected between a first pin on the memory control unit and a first pin on the memory unit;

delivering a second signal over a second signal line formed on the first layer of the circuit board and connected to the first pin [connection] of the memory unit, a first portion of the second signal line formed substantially parallel to a first portion of the first signal line, a second portion of the second signal line formed at an acute angle relative to a second portion of the first signal line[, wherein the first and second portions of the first and second signal lines are substantially equal in width]; and

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separating said first and second signal lines without a ground connection therebetween.

10. (Previously amended) The method of claim 8, further comprising delivering another signal to said memory control unit on another parallel layer of the circuit board over portions of the first and second signal lines that are not separated by any conductive traces.

11. (Previously amended) The method of claim 8, wherein delivering the first signal and the second signal include delivering the signals over portions of the first and second signal lines that have substantially equal widths.

12. (Previously amended) The method of claim 11, wherein delivering the first signal and the second signal include delivering the signals over portions of the first and second signal lines that are separated by a distance substantially equal to their widths.

13. (Previously amended) The method of claim 12, wherein delivering the first signal and the second signal include delivering the signals over portions of the first and second signal lines that are substantially equal to 5 mils wide and that are separated by a distance substantially equal to 5 mils.

14. (Currently amended) A method for use in manufacturing a computer system, the method comprising:

forming at least two parallel layers on a surface of a circuit board, with first and second signal lines on a first [selected] layer of the board;

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connecting a memory unit to the board such that a first pin [connection] on the memory unit connects to the first and second signal lines;

affixing a memory control unit to the board such that a first pin on the memory control unit connects to at least the first signal line;

forming a first portion of the second signal line to be substantially parallel to a first portion of the first signal line; and

forming a second portion of the second signal line to be at an acute angle relative to a second portion of the first signal line

[forming the first and second portions of the first and second signal lines substantially equal in width].

16. (Previously amended) The method of claim 14, further comprising forming the first and second signal lines such that no conductive trace lies between the first signal line and the first portion of the second signal line that is routed substantially parallel to the first signal line.

17. (Previously amended) The method of claim 16, further comprising forming the first signal line and the first portion of the second signal line that is routed substantially parallel to the first signal line to have substantially equal widths.

18. (Previously amended) The method of claim 17, further comprising forming the first signal line and the first portion of the second signal line that is routed substantially parallel to the first signal line to be separated by a distance approximately equal to their widths.

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19. (Previously amended) The method of claim 18, further comprising forming the signal lines such that the widths of the lines and the distance separating the lines are all substantially equal to 5 mils.

20. (Currently amended) A circuit board comprising at least two layers formed in parallel to a surface of said circuit board for use in a computer system comprising:

a memory unit;

a memory control unit; and

a data bus connecting the memory control unit to the memory unit and comprising:

a first signal line formed on a first layer of the circuit board and connected to a first pin on the memory control unit and to a first pin [connection] on the memory unit; and

a second signal line formed on the first layer of the circuit board and also connected to the first connection on the memory control unit, a first portion of the second signal line substantially parallel to a first portion of the first signal line, a second portion of the second signal line at an acute angle relative to a second portion of the first signal line,

wherein the widths of the lines and the distance separating the lines are each substantially equal, and

wherein said first layer defines a non-grounded gap between said first and second lines.

21. (Cancel) The circuit board of claim 20, wherein the first connection comprises a pin connection.

22. (Cancel) The computer system of claim 1, wherein the first connection on the memory unit comprises a pin connection.

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23. (New) The computer system of claim, wherein the memory unit comprises a memory repeater hub.

24. (New) The circuit board of claim 20, wherein the memory unit comprises a memory repeater hub. --

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REMARKS

Claims 1, 8, 14 and 20 are currently amended. Claims 20 21 and 22 have been cancelled. Claims 23 and 24 have been added. Claims 1, 3-8, 10-14, 16-20 and 23-24 are pending. Claims 1, 8, 14 and 20 are the independent claims.

Claims 1,3,7,8,10, 14, 16, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boaz et al. [6,061,263 A; hereinafter Boaz] in view of Kumakura et al. [US Patent No. 6,114,751 A; hereinafter Kumakura], Applicant Admitted Prior Art [hereinafter AAPA] and Perino et al. [US Patent No. 6,160,716 A; hereinafter Perino]. Claims 6, 13, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boaz in view of Kumakura, AAPA and Perino; as applied to claims 1,3,7,8,10,14,16 and 20-22 above, and further in view of Holman et al. [US Patent No. 6,005,776 A; hereinafter Holman].

Claims 1,3-8,10-14, and 16-22 stand rejected under 35 USC 103(a) under various combinations of cited prior art and alleged AAPA. These contentions have been obviated by the claim amendments which are made herein.

The present application describes routing a signal line through a single layer of a multi-layer circuit board between a memory control unit and a memory unit where both the memory unit and memory control unit are connected to the signal line by pins (page 2, line 21 through page 3, line 4). The inventor found that a gap formed between neck down portions of each signal line provides an isolation between the signal lines yet reduces the area required to route the signal lines on a circuit board. Placing the gap, and not a ground trace, between the neck-down portions may reduce congestion at the memory unit. This allows

the signal lines into and out of the memory unit to be routed through a single layer of the circuit board on which both the memory control unit (MCU) and the memory unit reside (page 4, lines 13-17). Routing the signal lines in this manner may reduce the number of layers required to route signals between the MCU and the memory unit by a factor of two. As a result, the circuit board on which the MCU and memory unit reside can be less expensive to produce than conventional memory boards. One description of a computer system is given on page 2, line 19 through page 3, line 4. Another description of a computer system is given on page 4, lines 15-17.

Consider exemplary independent claim 1, as currently amended, which recites in relevant part: "A computer system comprising: a circuit board comprising: at least two layers formed in parallel to a surface of said circuit board, a first signal line, formed on a first layer of the circuit board and connected between a first pin on the memory unit and a first pin on the memory control unit; and a second signal line also formed on the first layer of the circuit board and connected to the first pin on the memory unit, a first portion of the second signal line substantially parallel to a first portion of the first signal line, a second portion of the second signal line at an acute angle relative to a second portion of the first signal line, wherein said first layer defines a non-grounded gap between said first and second lines".

In contrast, Boaz teaches two separate boards, i.e., motherboard 10 and RIMM board 17 that are connected through an edge connector 19, i.e., a motherboard 17 that includes a plurality of edge connectors 19, and a plurality of memory module boards 14 that are inserted (and connected) to each of the edge connectors 19 (col. 2, lines 36-57). Moreover, Boaz describes the memory controller 15 as being connected to

motherboard 10 and memory chip 21 being connected to a memory module board 17. Therefore, Boaz cannot properly be characterized as describing "A computer system comprising: a circuit board comprising: at least two layers formed in parallel to a surface of said circuit board, a first signal line, formed on a first layer of the circuit board and connected between a first pin on the memory unit and a first pin on the memory control unit; and a second signal line also formed on the first layer of the circuit board and connected to the first pin on the memory unit", as recited by Applicant's exemplary claim 1.

Applicant also wishes to clarify the features of the prior art system shown on Fig. 2 of the application. The Applicant describes the prior art system of Fig. 2 that includes a "signal line 150 [that] narrows, or "necks down", to a width of approximately 5 mils. The signal line 160 exiting the pin 155 also has a width of approximately 5 mils before expanding to a width of approximately 18 mils." (page 2, lines 7-10 of the application.) That is, Fig. 2 shows the tapering of signal lines 150 and 160, and is further supported by the application which describes the signal lines 150 and 160 as narrowing and/or expanding to the connection point 155. Furthermore, Fig. 2 shows a ground trace 165 that is required to separate the neck down portion of the signal lines 150, 160. The ground trace typically must be formed on different layers of the circuit board than the signal lines, therefore increasing the number of layers required on the circuit board. Nowhere in the prior art system of Fig. 2 is it shown or suggested that a circuit board comprises "a first portion of the second signal line substantially parallel to a first portion of the first signal line, a second portion of the second signal line at an acute angle relative to a second portion of the first signal line,

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wherein said first layer defines a non-grounded gap between said first and second lines", as recited by Applicant's claim 1.

None of the art of record discloses or suggests the combination of features recited in independent claim 1.

Claims 8, 14 and 20 are the other independent claims and are currently amended. Claims 8, 14 and 20 have similar limitations to independent claim 1. In view of the foregoing distinctions, Applicant respectfully submits that independent claims 1, 8, 14 and 20 are patentably distinguishable over the cited art. Applicant respectfully submits that claims 1, 8, 14 and 20 are in condition for allowance, and Applicant respectfully requests allowance of claims 1, 8, 14 and 20.

Claims 3-7, 10-13, 16-19 and 23-24 depend either directly or indirectly from one of the independent claims. Each dependent claim further defines the independent claim from which it depends. In view of the foregoing remarks regarding claims 1, 8, 14 and 20, Applicant respectfully submit that claims 3-7, 10-13, 16-19 and 23-24 are likewise in condition for allowance. Applicant respectfully requests allowance of claims 3-7, 10-13, 16-19 and 23-24.

Applicant asks that all claims be allowed. Enclosed is a **Enter \$ amount** check for excess claim fees. Please apply any other charges or credits to Deposit Account No. 06-1050.

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Respectfully submitted,

Date: _____

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